Title of Investigation: Design Data Collection with Skylab/EREP Microwave Instrument S-193

Title of Report: Design Data Collection with Skylab/EREP Microwave Instrument S-193

CRES Monthly Letter Progress Report #9

May, 1974

NASA Contract NAS 9-13331

Prepared For:

Principal Investigations Management Office
Technical Monitor: Mr. Larry B. York
NASA Lyndon B. Johnson Space Center
Houston, Texas 77058

Prepared by:

Arun Sobti, Project Engineer
University of Kansas Center for Research, Inc.
Remote Sensing Laboratory
Lawrence, Kansas 66045

Type of Report: Monthly Letter Progress Report

THE UNIVERSITY OF KANSAS CENTER FOR RESEARCH, INC.
2385 Irving Hill Rd.—Campus West Lawrence, Kansas 66044

DESIGN DATA COLLECTION WITH SKYLAB/EREP MICROWAVE INSTRUMENT S-193

Richard K. Moore, Principal Investigator
Fawwaz T. Ulaby, Co-Investigator

Arun Sobti
Project Engineer

Cheng King, John Barr, Bruce Short
and Saad Ulaby
Research Assistants

Remote Sensing Laboratory
Center for Research, Inc.
University of Kansas
Lawrence, Kansas 66045

Larry York, Technical Monitor
Principal Investigations
Management Office
Lyndon B. Johnson Space Center
Houston, Texas 77058

EREP No. 549-M, March 28, 1973 to September 30, 1974
Contract Number NAS-9-13331

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DESIGN DATA COLLECTION WITH
SKYLAB/EREP MICROWAVE INSTRUMENT S-193

The University of Kansas Center for Research, Inc. reports the following work performed during the period 1 May 1974 to 31 May 1974.

1.0 CONTINUING STUDIES

1.1 (Task 2.1.1.2, 2.1.3.1, 2.1.3.2) Development of Catalogue for Radiometer Temperature Measurements Performed to Date.

Satisfactory progress was made in compilation of this catalogue.

1.2 (Task 2.1.3.3) Study of Effects of Atmosphere Upon S193 Rad/Scat Measurements

Satisfactory progress was made in compilation of this report.

1.3 (Task 2.1.1.5, 2.1.3.1, 2.1.3.2) Ground Truth Collection and Data Catalogue

It has come to our attention (through a letter from NASA) that due to an error in the read out of the gyros during SL-2, the estimated position of the spacecraft can be in error by as much as 10 nautical miles. An attempt to establish the correct position of the vehicle so that all listed footprints can be considered reliable in spatial location is underway. For this analysis a specific site, for which the University of Kansas feels there is sufficient supporting data, is being examined. The site (Texas - CTC R/S pitch 30°, pol. VV, on DOY156) consists of some area which contain cells for which the soil moisture is known; some cells have water bodies in them. The daily precipitation for 5 days prior (and inclusive of the day of the pass), the highest temperature recorded on the day of the pass, the soil permeability, the cloud cover and the general land-use are the supporting evidence to be related to the S193 radiometer temperature and the differential backscattering coefficient. Since there are only a few samples of the supporting data (e.g. temperature and precipitation are reported by weather-reporting stations) a program has been employed which produces (by extrapolation and interpolation) a map showing the spatial distribution of the parameter of interest. Examples of such maps are shown in Figures 1 through 10.

Another purpose for performing such specific-site studies is to determine those factors which would influence the cataloging of Skylab data. Other test sites to be examined in depth include one over Kansas (DOY 256 CTC pitch 40, pol VV), one over Minnesota (DOY 254, CTC pol VV), and some over a land/water interface. The choice of these test sites was based upon the fact that many individual footprints will hopefully be comprised of either one or at most two categories, thus allowing a simplified interpreting scheme. The land/water interface sites will help establish the position errors, and more important, should allow us to better estimate the antenna effects.

Each footprint is analyzed based upon S190 coverage and land-use maps and cataloged. A sample recording is provided in Figure (11). This description is used to correlate the radiometric temperature/differential backscattering coefficient to the surface.

2.0 REPORTS COMPLETED

There were no reports completed this month.

3.0 SPECIAL ANALYSES

No special analyses were requested of us.

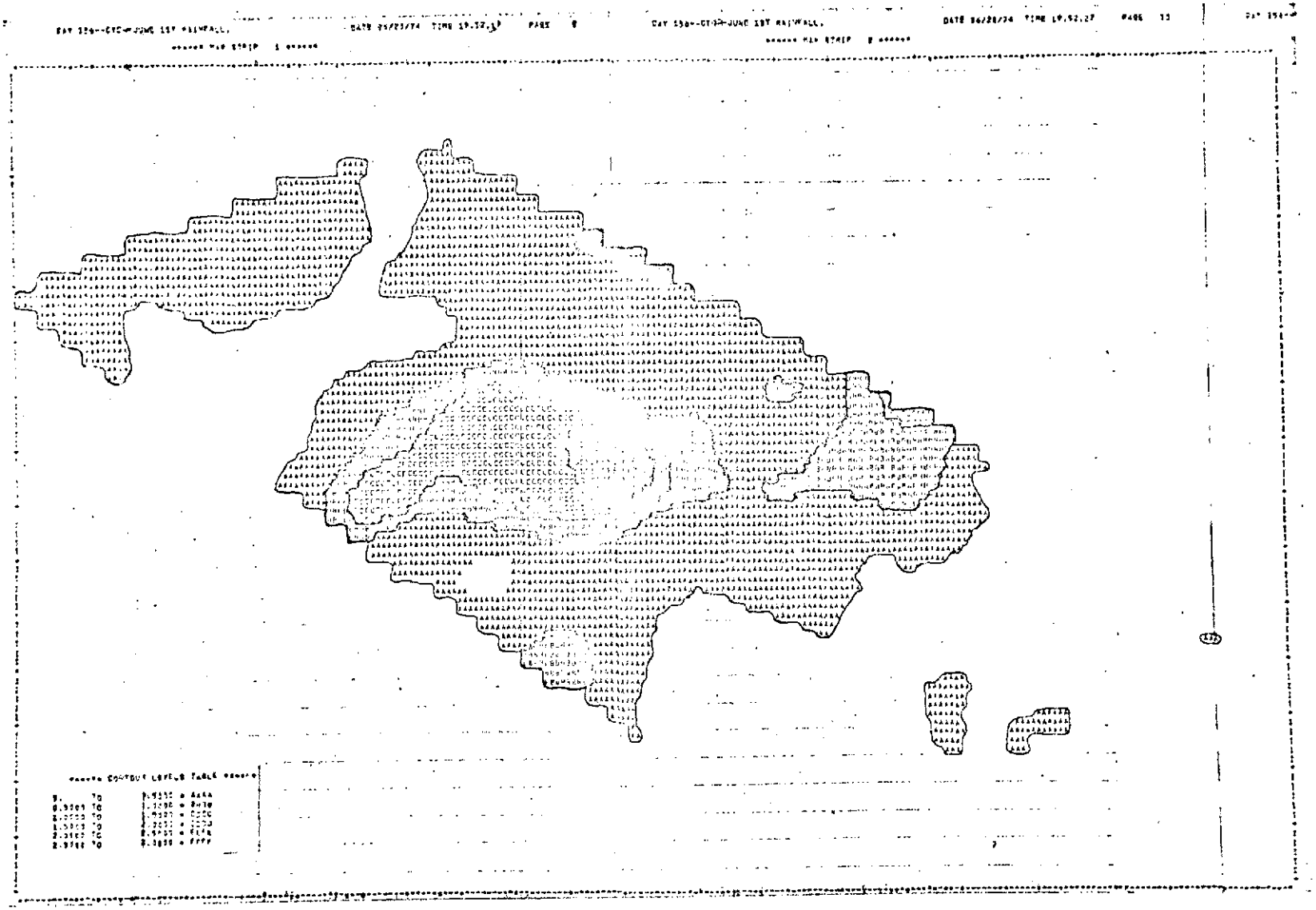
4.0 DATA RECEIVED

Attached is a preliminary copy of the SL-3 data available in tabulation form at the University of Kansas over the continental U. S. In many cases the data are merely housekeeping parameters or similar raw data from SKYLAB.

5.0 COMMENT

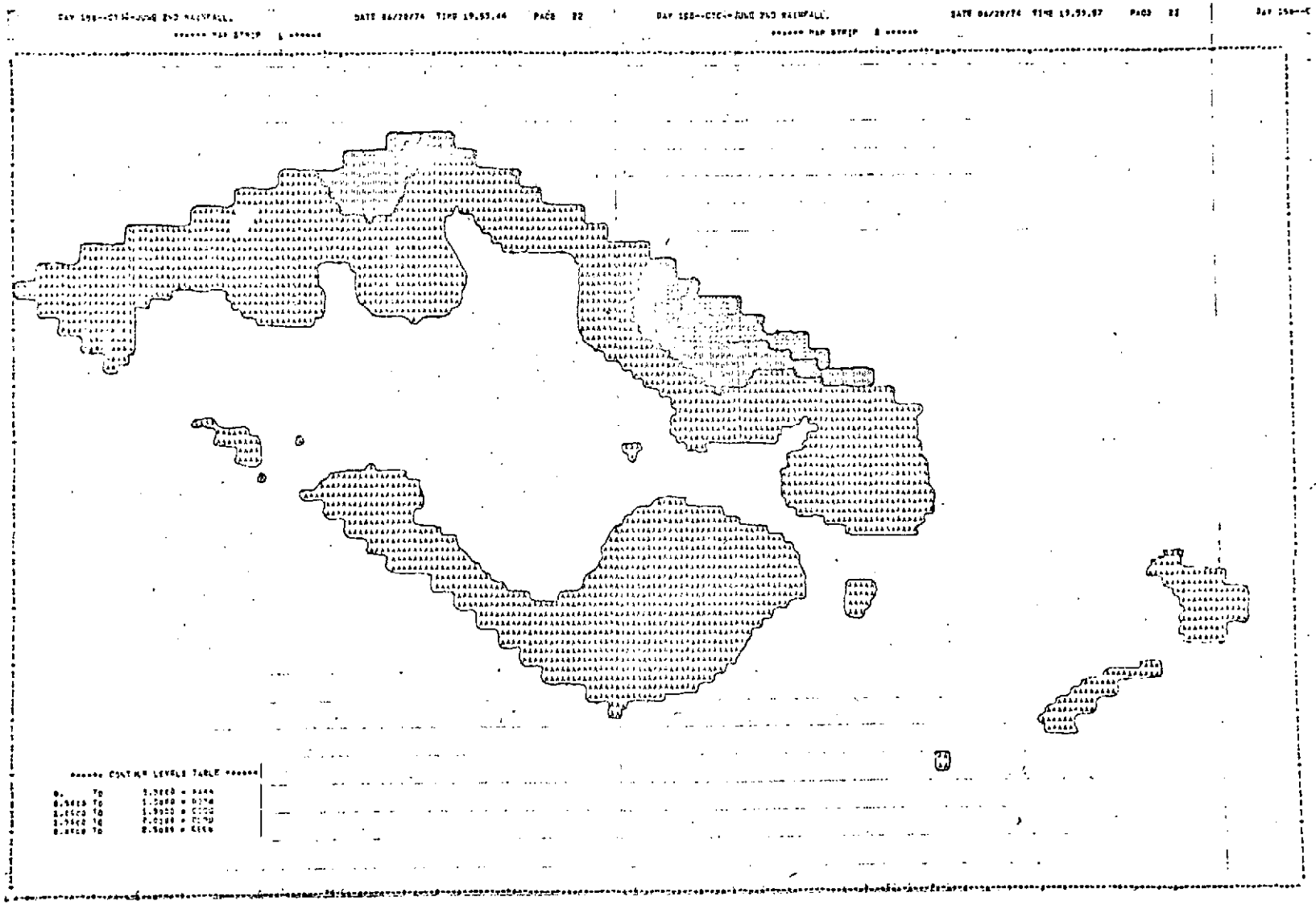
Dr. Moore and Arun Sobti will participate in the PI conference scheduled for July 16, 17, 18. We feel that a report generated by the University of Kansas, Remote Sensing Laboratory, entitled "A Survey of Differential Backscattering Measurement Programs," by C. King and R. K. Moore, and mailed to NASA should be published by the PIMO office.

AS:rh



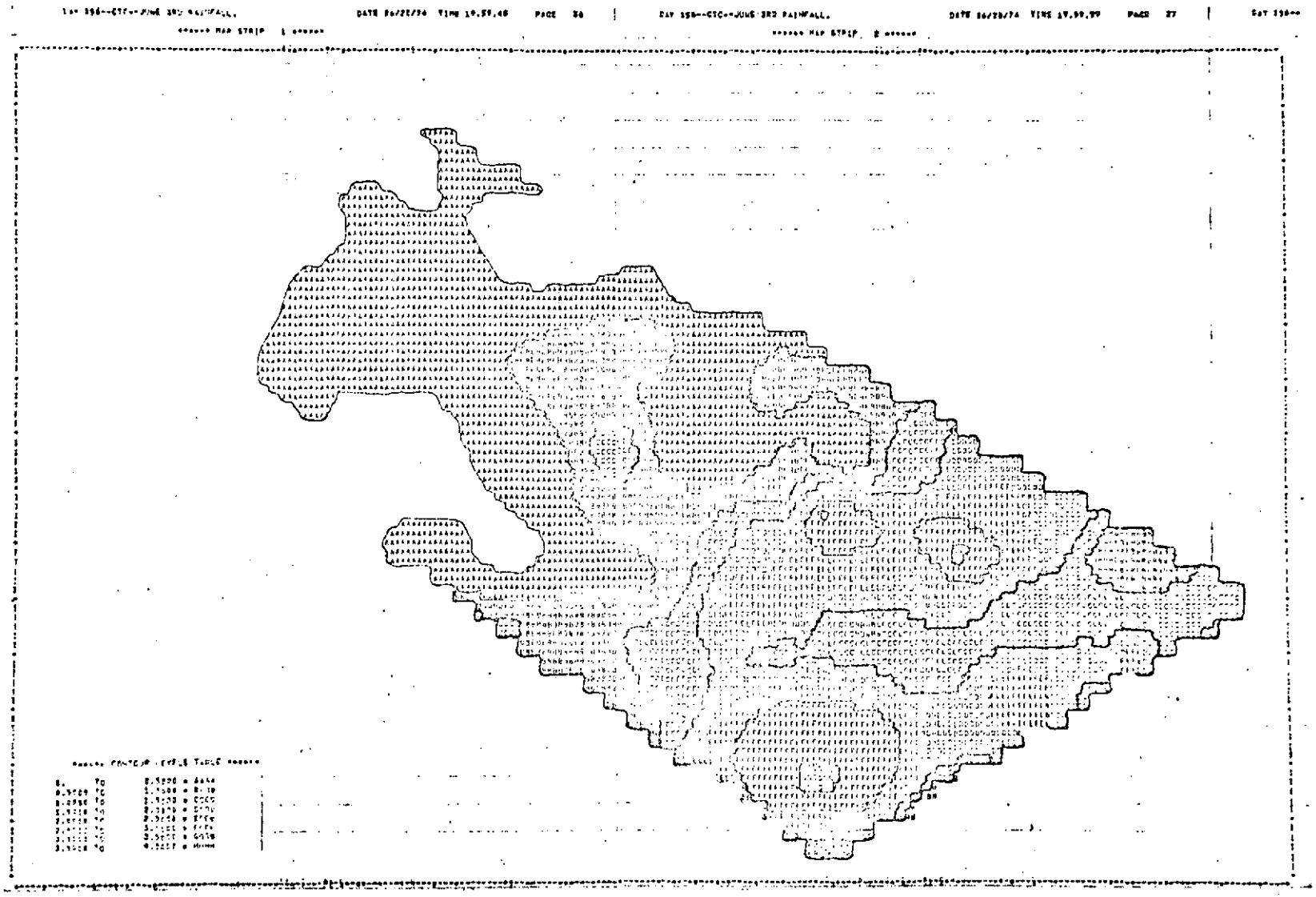
JUNE 1 RAINFALL

FIGURE 1.



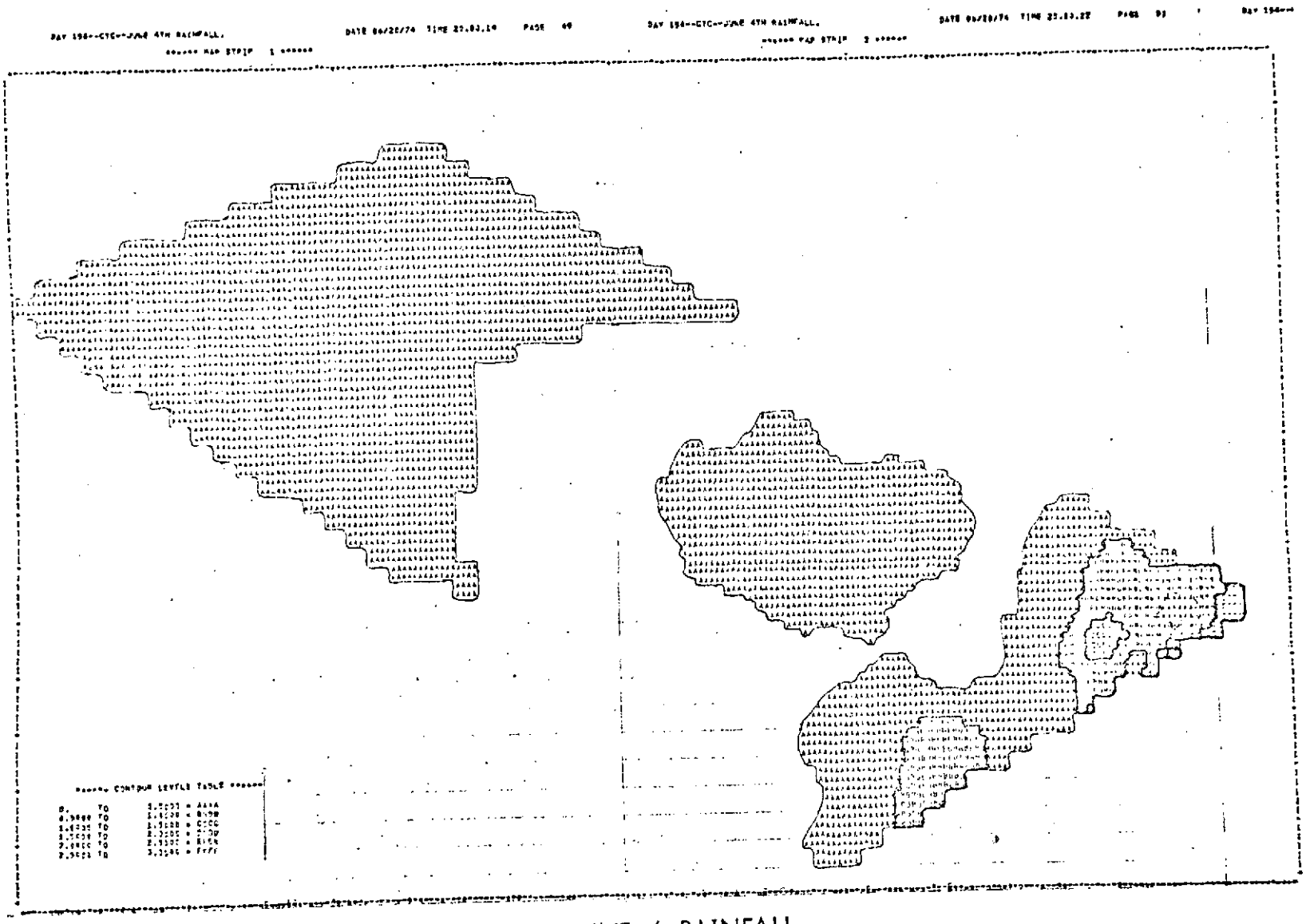
JUNE 2 RAINFALL

FIGURE 2.



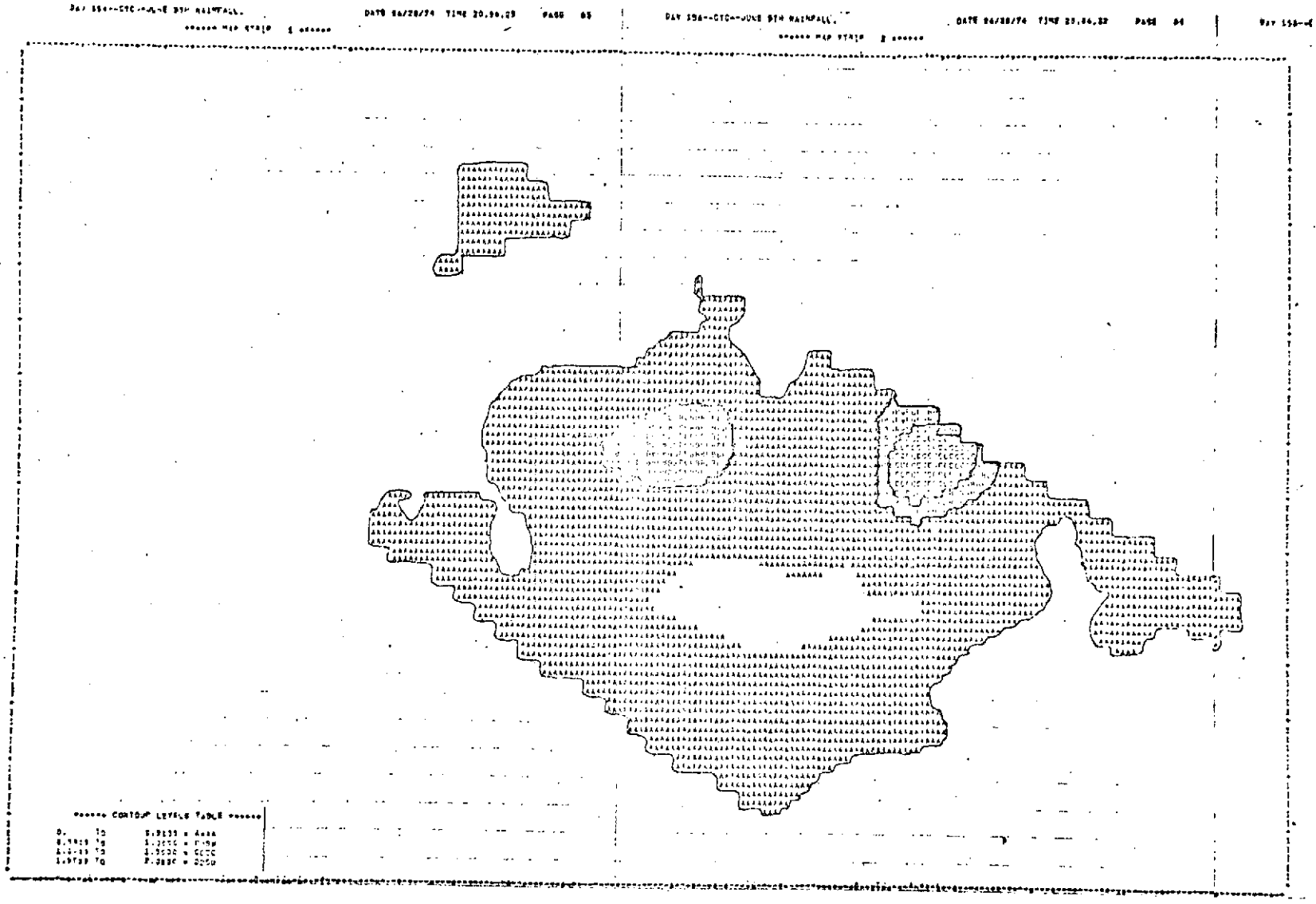
JUNE 3 RAINFALL

FIGURE 3.



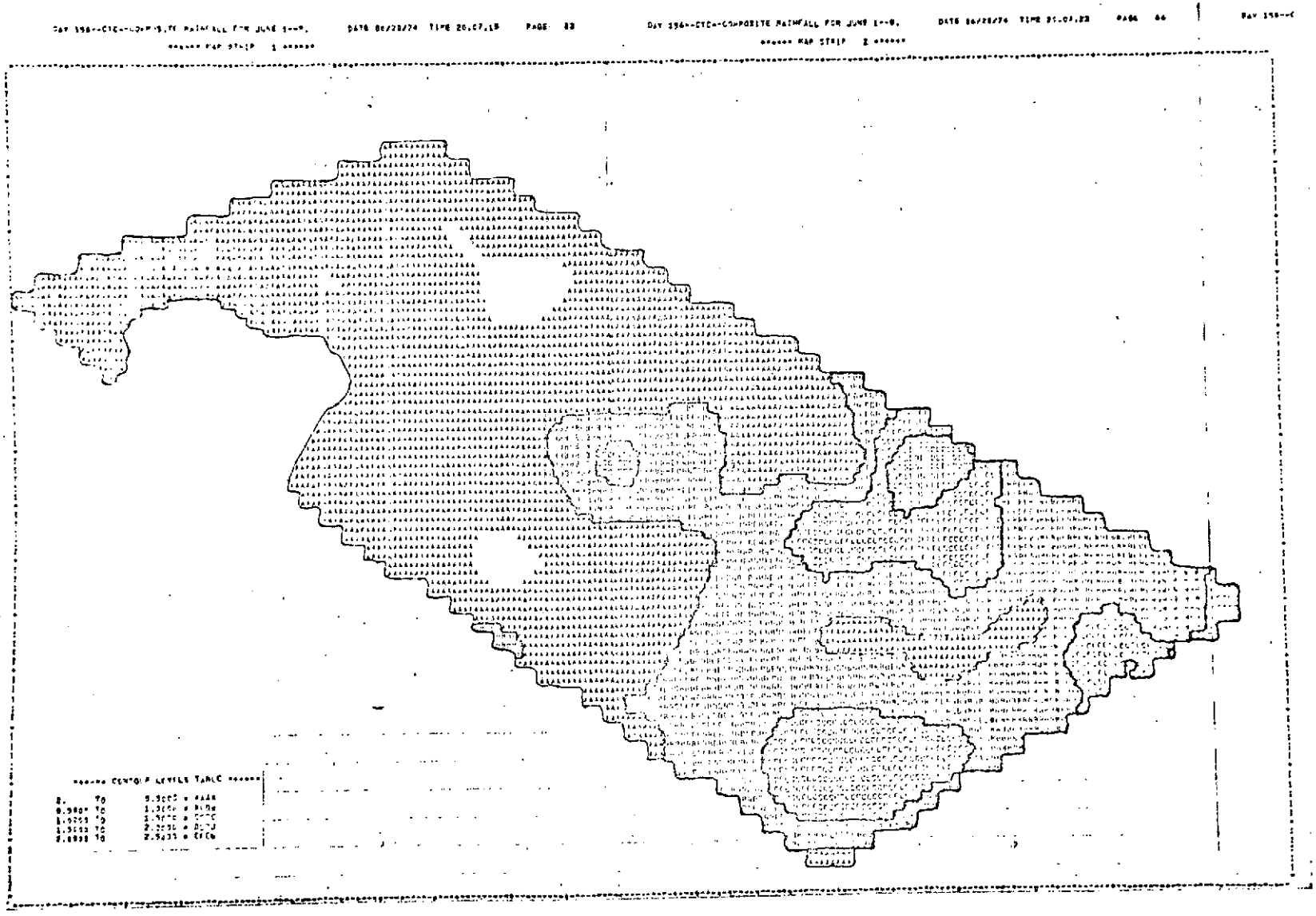
JUNE 4 RAINFALL

FIGURE 4.



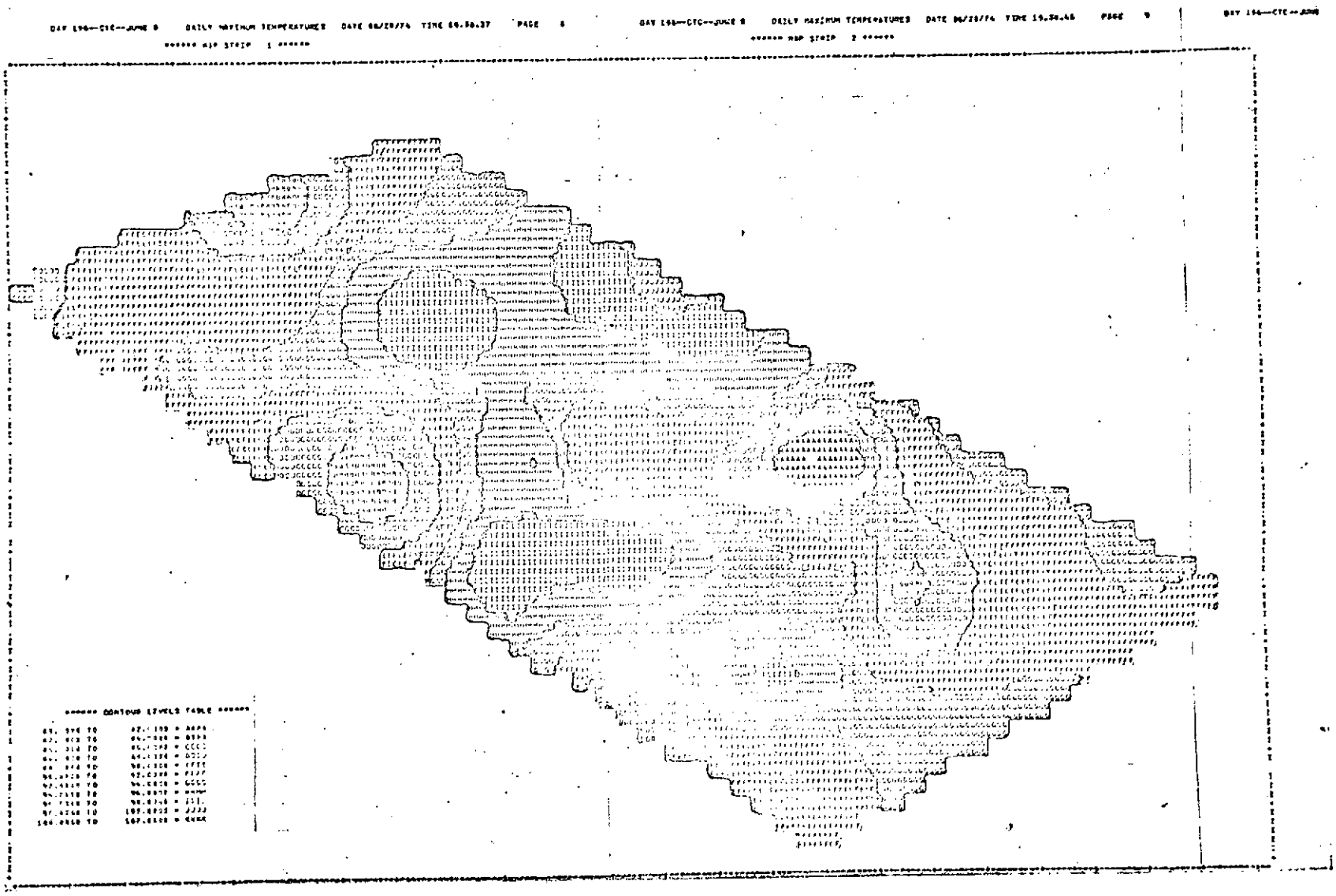
JUNE 5 RAINFALL

FIGURE 5.



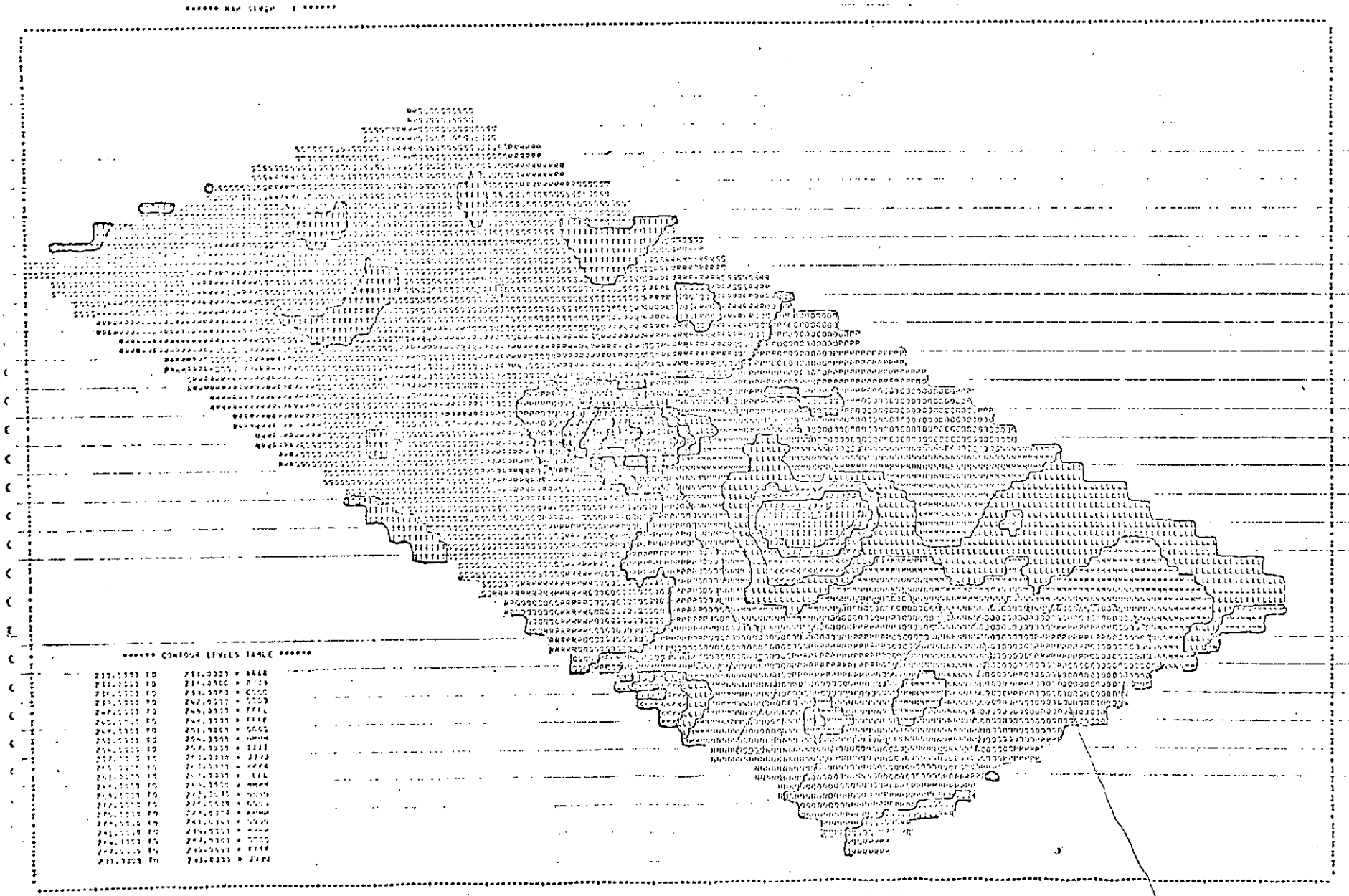
COMPOSITE RAINFALL HISTORY --- JUNE 1 - 5.

FIGURE 6.



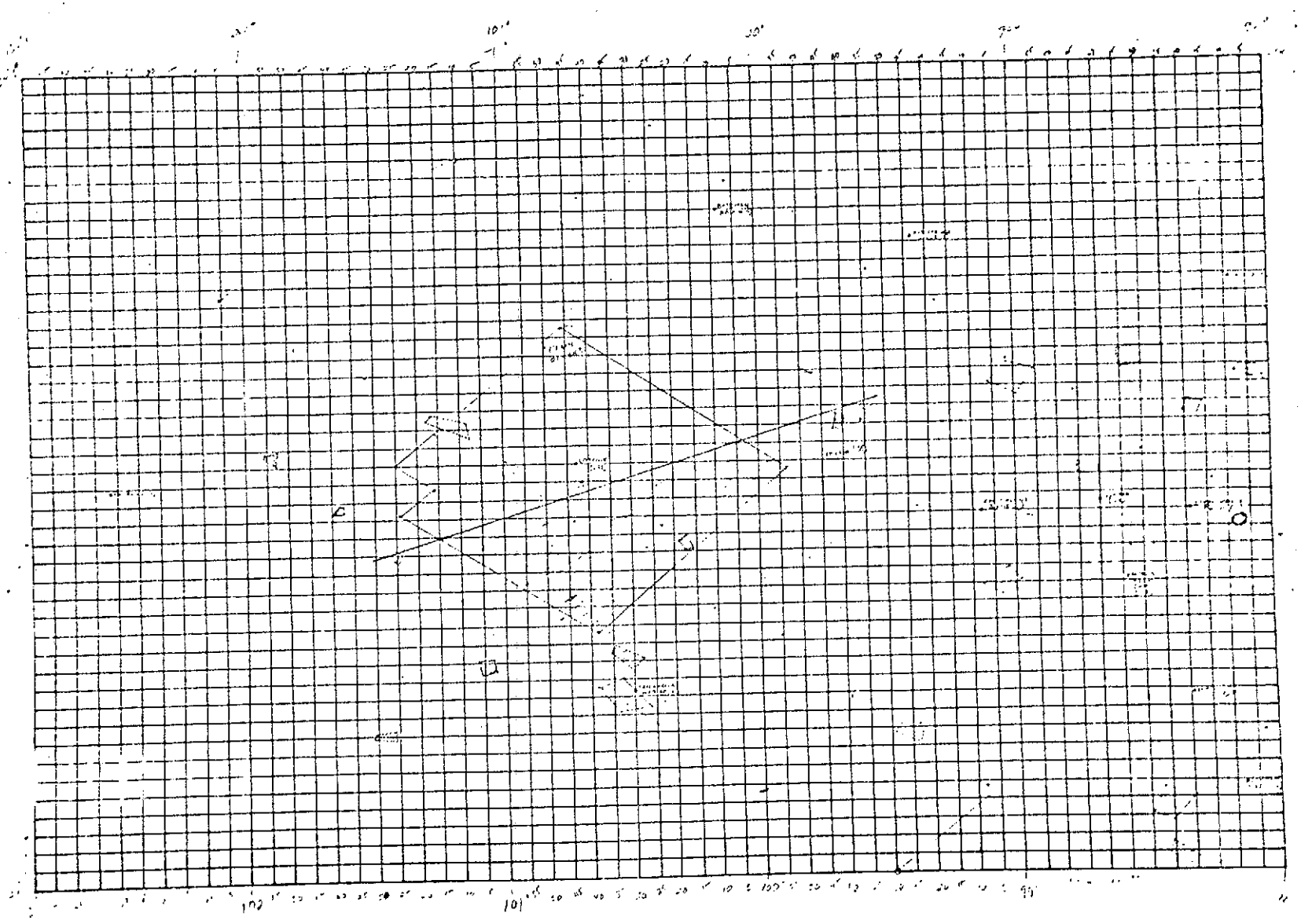
JUNE 5 DAILY MAXIMUM TEMPERATURE

FIGURE 7.



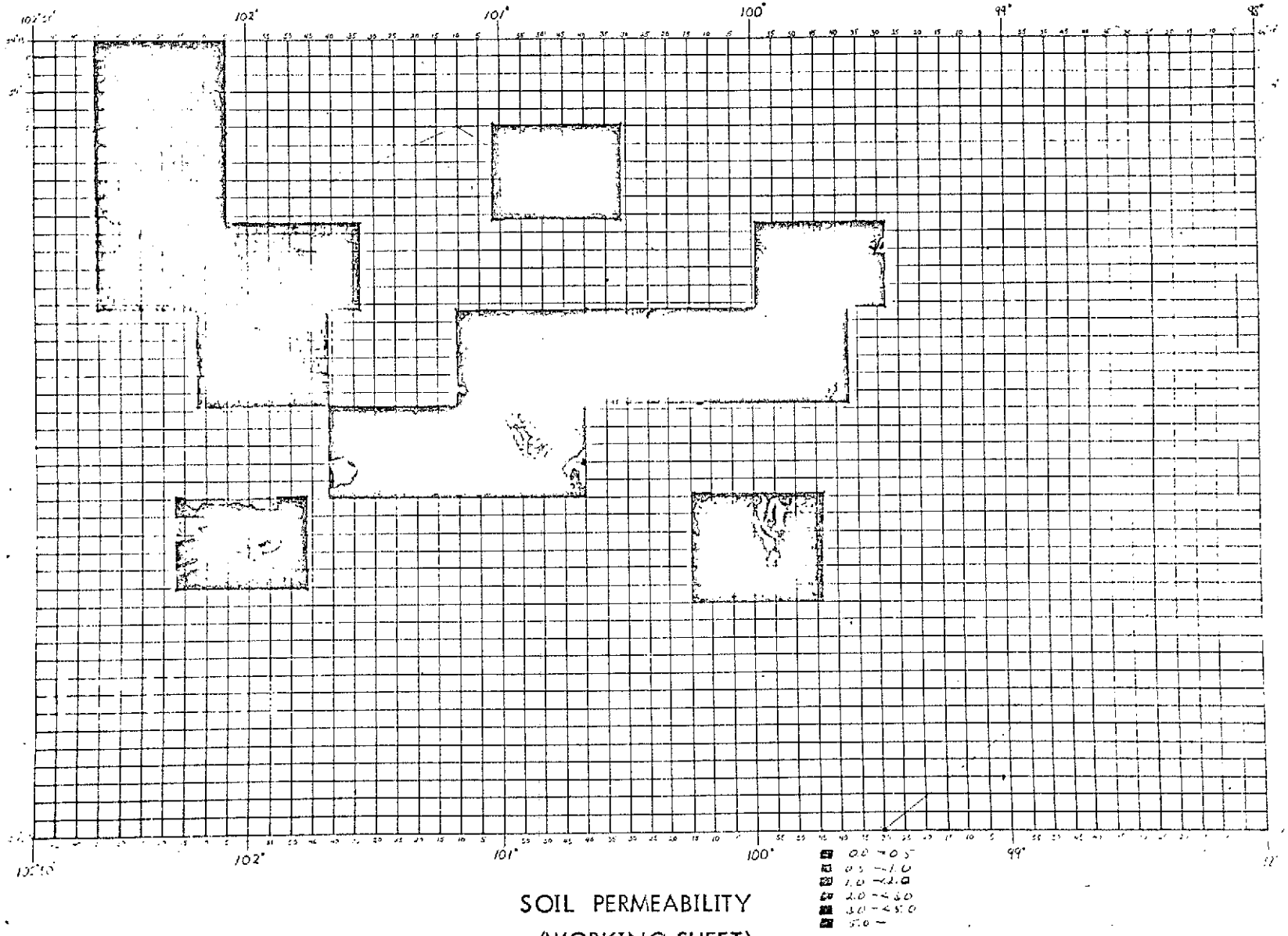
RADIOMETER TEMPERATURES

Figure 8



(WORKING SHEET)

FIGURE 9.

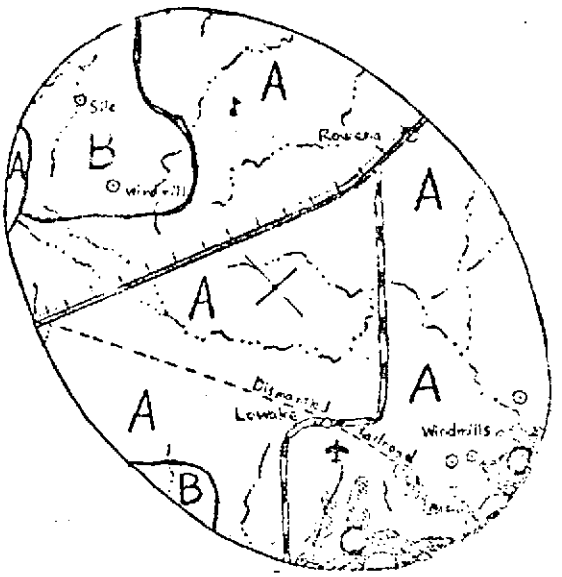


SOIL PERMEABILITY
(WORKING SHEET)
FIGURE 10.

RAD.

TRUE NORTH

DAY: 156 (5 JUN 73)
TIME: 18 0.58.16
MODE: CTC (RAD.)
INCIDENCE ∠: 32.1610
PITCH ∠: 29.8070
ROLL: −3.8695
POLARIZATION: VV
ANT. TEMP: 271: 7821
LAT. 31 36.5 N
LONG. 100 5.5 W



Az. 138°

LEGEND

	MEDIUM DUTY HARD SURFACE ROAD
	HEAVY DUTY HARD SURFACE ROAD
	RAILROAD
	INTERMITTENT OR DRY STREAM
	PERENNIAL STREAM
‡	AIRFIELD
A	RANGE LAND
B	FARM LAND
C	WOODLAND

PHYSICAL DATA

TEMP: 92° F D/MAX.
65° F D/MIN.

PREC: 00

SOIL PERMIABILITY:
SLOW-MODERATE
MODERATE

ATMOSPHERIC DATA
FROM NEAREST STATION

SUMMARY

THE TARGET CONSISTS OF THREE PRIMARY CATEGORIES, AS INDICATED AT LEFT. OF THESE, CAT. A ACCOUNTS FOR APPROXIMATELY 80%, CAT. B 15%, AND CAT. C 5% OF THE TOTAL AREA. THE WOODLAND VEGETATION CONSISTS PRIMARILY OF MESQUITE AS OPPOSED TO MORE ADVANCED ARBOREAL TYPES. CULTURAL PHENOMENA WITHIN THE TARGET INCLUDE MEDIUM AND HEAVY DUTY MULTI-LANE HIGHWAYS, A RAILROAD, AND TWO SMALL TOWNS.

Figure 11

CONTINENTAL U S PASSES – SL3

DOY	DATE	START GMT	STOP GMT	PASS NO.	GROUND TRACK	START – LOCATION LAT	START – LOCATION LONG	STOP – LOCATION LAT	STOP – LOCATION LONG	MODE	S-190 COVERAGE	REMARKS
215 B	8-3-73	17:58:38.150	17:59:10.13	1	34	46.233	126.918	45.504	124.512	CTC P0		TAPE HAVE MODE AS ITC OUT OF U.S
215 D	8-3-73	17:59:11.955	18:00:40.099	1	34	44.802	124.550	42.867	117.589	CTC P0		TAPE HAVE MODE AS ITC
215 G	8-3-73	18:01:10.366	18:01:29.941	1	34	40.670	112.811	40.089	111.680	CTC P29		
215 I	8-3-73	18:01:31.460	18:01:59.922	1	34	39.876	111.436	38.945	109.609	CTC P29		TAPE HAVE MODE AS IT
215 L	8-3-73	18:09:33.842	18:09:56.132	1	34	21.034	87.875	20.027	86.963	CTC P0		IN OCEAN
215 O	8-3-73	18:09:57.054	18:10:26.136	1	34	19.925	86.878	18.571	85.776	CTC P0		OUT OF U.S. DISREGARD
215 R	8-3-73	18:10:42.430	18:11:05.042	1	34	17.781	84.971	16.759	84.103	CTC P0		OUT OF U.S. DISREGARD
216 B	8-4-73	17:19:53.121	17:20:44.942	2	48	38.318	103.824	36.197	100.901	CTC P15		
216 E	8-4-73	17:20:46.014	17:21:35.983	2	48	36.301	100.587	34.294	97.820	CTC P15		
216H	8-4-73	15:25:20.452	17:26:59.977	2	48	25.289	87.202	20.774	82.850	CTC P0		OUT OF U.S. DISREGARD
217 A	8-5-73	15:02:06.215	15:02:12.590	3	61	40.69	79.51	41.56	81.35	ITNC		
217 D	8-5-73	16:37:41.834	16:38:20.178	4	62	36.476	95.988	35.002	93.924	CTC P29		
220 B	8-3-73	15:58:58.954	16:00:54.997	5	34	44.686	121.873	41.150	113.560	CTC P15		
220 C	8-3-73	16:03:58.349	16:04:39.992	5	34	33.421	101.058	31.776	98.835	CTC P29		
220 D	8-8-73	16:04:57.209	16:06:56.252	5	34	30.231	96.941	24.37	90.56	ITC		TAPE HAVE MODE AS ITC
221 A	8-9-73	13:41:10.723	13:42:15.223	6	47	47.840	104.350	46.473	98.968	CTC P0		
221 C	8-9-73	13:42:16.329	13:43:25.685	6	47	46.433	98.783	44.670	93.378	CTC P0		
						38.808	90.552	39.721	87.392	TTC		TAPE HAVE MODE AS ITC

CONTINENTAL U S PASSES - SL 3

DOY	DATE	START GMT	STOP GMT	PASS NO.	GROUND TRACK	START - LOCATION LAT	START - LOCATION LONG	STOP - LOCATION LAT	STOP - LOCATION LONG	MODE	S-190 COVERAGE	REMARKS
221 I	8-9-73	13:14:45.879	13:16:5:00.204	6	47	41.370	86.453	41.175	85.172	ITC		ACT CUTTED TAPE HAVE NO DATA AT ST START BUT AS CTC BAD CONTACT SUCH
222 I	[illegible]	15:26:14.891	15:27:40.055	7	6	33.963	118.659	37.818	116.954	ITC		
223 B	8-11-73	15:23:17.201	15:28:02.234	7	6	36.642	115.012	35.139	112.775	CTC PO		
224 C	8-12-73	16:46:29.910	16:47:20.985	9	20	35.020	105.910	33.016	103.205	CTC Roll 15		TAPE HAVE NO DATA
249 A	9-6-73	21:27:30.229	21:29:00.022	16	30	39.570	102.441	42.591	96.347	CTC PO		
250 B	9-7-73	20:38:50.574	20:41:03.117	17	44	26.619	114.967	32.578	108.326	CTC P29		
250 D	9-7-73	20:41:22.322	20:43:15.140	17	44	34.003	106.065	37.209	101.468	ITC		
250 H	9-7-73	20:43:18.046	20:45:23.055	17	44	38.580	99.087	41.905	92.878	ITC		
252	9-9-73	NOT			AVAILABLE							
253 A B	9-10-73	18:31:29.458	18:39:06.242	19	15	30.78	95.84	46.02	67.97	ITC		OUT OF U.S.
253 C	9-10-73	20:05:25.372	20:05:53.273	20	16	30.693	119.885	31.789	118.562	CTC PO		
253 D	9-10-73	20:05:54.941	20:06.11.910	20	16	31.915	118.281	32.589	117.535	CTC PO		
253 E	9-10-73	20:08:53.637	20:11:00.124	20	16	39.073	107.880	43.290	99.203	CTC PO		
253 G	9-10-73	20:12:15.637	20:14:15.880	20	16	45.449	93.330	48.235	83.408	CTC PO		
254 R	9-11-73	20:54:57.017	21:01:26.079	23	31	42.60	119.50	44.32	115.43	ITC		
254 T	9-11-73	21:05:41.223	21:06:10.192	23	31	48.311	95.231	48.590	92.889	CTC Roll Right 15		
255 A	9-12-73	17:06:30.454	17:06:42.154	25	43	30.719	86.512	31.125	85.916	CTC PO		
										CTC		

CONTINENTAL U S PASSES - SL3

DOY	DATE	START GMT	STOP GMT	PASS NO.	GROUND TRACK	START-LOCATION LAT	START-LOCATION LONG	STOP-LOCATION LAT	STOP-LOCATION LONG	MODE	S-190 COVERAGE	REMARKS
255 E	9-12-73	17:15:23.571	17:16:49.932	25	43	36.206	97.107	39.501	92.138	CTC RUNWAY 20-36		
255 F	9-12-73	20:20:57.080	20:21:54.079	26	45	118.47	95.64	48.90	93.42	ITC		
~~255 [illegible]~~										~~ITC P24~~		
256 D	9-13-73	17:56:46.991	17:58:00.134	27	58	32.964	102.239	35.935	98.112	CTC P40		
256 E	9-13-73	17:58:01.090	17:59:14.833	27	58	36.024	97.987	38.782	93.559	CTC P40		
256 F	9-13-73	17:59:27.846	18:00:30.246	27	58	37.396	96.187	39.638	92.253	CTC P0		
256 G	9-13-73	18:00:31.334	18:00:38.008	27	58	39.839	92.040	39.853	91.842	CTC P0		
256 H	9-13-73	18:00:39.827	18:00:47.681	27	58	40.140	91.476	40.290	91.194	CTC P0		
256 I	9-13-73	18:00:48.302	18:01:20.102	27	58	40.312	91.007	41.332	89.002	CTC P0		
256 K	9-13-73	18:01:22.127	18:01:46.962	SCAT, BACKSCAT				DATA NOT AVAILABLE				
256 M	9-13-73	19:32:05.175	19:32:22.068	28	59	38.103	118.213	37.689	119.008	ITC		
256 N	9-13-73	19:32:25.200	19:32:50.175	28	59	38.817	117.001	38.631	117.453	ITC		
257 D	9-14-73			29	1	DISREGARD				UNKNOWN		THIS MODE IS A DISCREPENCY. SUPPOSE TO BE 12